Unit 1 - Systems of Linear Equations

Consider:

A linear relation can be represented graphically as a straight line.

A straight line is made up of an infinite number of points, (x, y), connected together.

Some other straight line would be made up of an infinite number of different points.

What does it mean for these lines to intersect?

Unit 1 - Systems of Linear Equations

2 lines

Solving Linear Systems Graphically

The solution to a linear system is the point (x,y) where the lines intersect.

Each of the following pairs of equations forms a linear system.

Consider their graphs to determine the number of solutions:

a) $y=2x+4$
$y=-x+4$

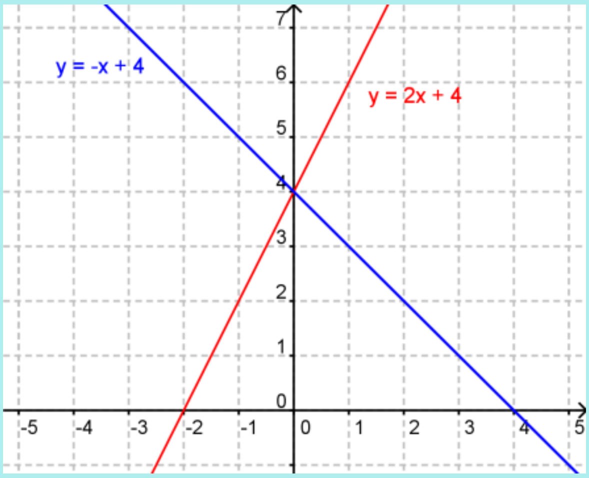
b) $y=x-3$
$4x-4y=12$

c) $y=2x+4$
$y=2x$

d) $y=2x+4$
$y=2-x$

a) $y=2x+4$

$y=-x+4$



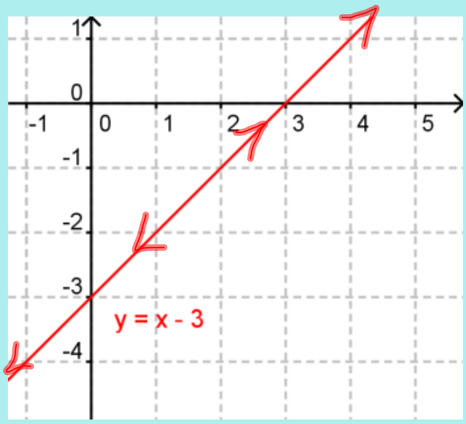
lines cross once at y-intercept
"one solution"

c) $y=x-3$

$4x-4y=12$

$$\frac{-4y}{-4}=\frac{-4x}{-4}+\frac{12}{-4}$$

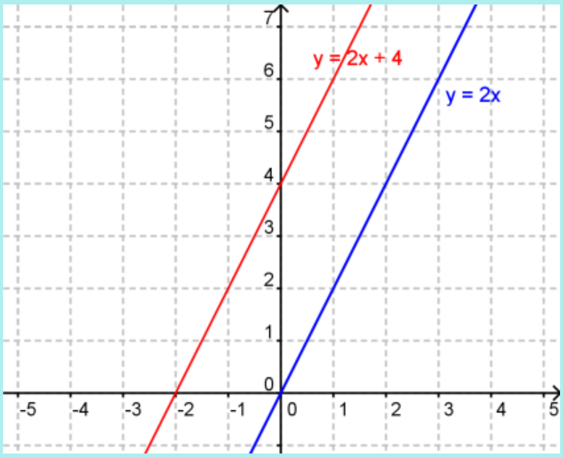
$$y=x-3$$



Coincident
infinite # of solutions

Slopes of the two lines - "same"
y-intercepts of the 2 lines - "same

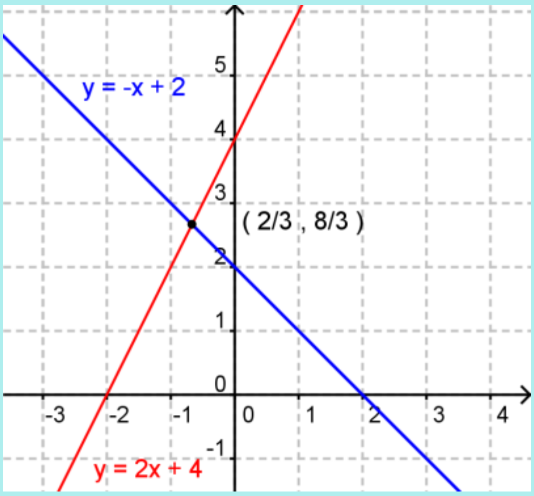
d) $y = 2x + 4$
$y = 2x$



Lines are parallel

No Solutions

b) $y = 2x + 4$
$y = 2 - x$



Graphing is great if the number are exact!

Tomorrow "Algebra"

In Summary:

For no solution:
- same slope and different y-intercepts

For exactly one solution:
- different slopes only
- some graphical systems can only be solved exactly using technology

For infinitely many solutions:
- same slope and same y intercept

Ex.1 Given $y = 2x + 5$ write a second equation such that the system has:
i) no solution
ii) exactly one solution
iii) infinitely many solutions.

i) $y = 2x + 7$

ii) $y = 3x$

iii) $y = 2x + 5$

To <u>verify</u> or <u>check</u> a solution, (x, y), <u>substitute</u> the values for x and y into the LS and RS of each equation.

If LS = RS for each equation, the solution (x, y) is valid, or correct.

Ex.2 Verify that (-1, 2) is a solution to the system

① $y = 3x + 5$

② $x + y = 1$

①

L.S. = y
= 2

R.S. = 3x + 5
= 3(-1) + 5
= -3 + 5
= 2

L.S. = R.S.

L.S. = x + y
= -1 + 2
= 1

R.S. = 1

L.S. = R.S.

∴ (-1, 2) satisfies both equations

Ex.3 What value of a gives a system with no solution?

$x(a-1) - y + 6 = 0$ ①

$2x + y - 3 = 0$ ②

② $y = -2x + 3$

① $y = x(a-1) + 6$

a = -1

Assigned Work:

p. 26 # 1ab, 2, 3ab, 5abf, 10, 18*

Attachments

Basic 2D Grid.agg